

DRINKING WATER SURVEILLANCE PROGRAM

**ALVINSTON
WATER TREATMENT
PLANT**

REPORT FOR 1991 AND 1992

TD
227
A58
A58
MOE

 Ontario

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**ALVINSTON WATER TREATMENT PLANT
DRINKING WATER SURVEILLANCE PROGRAM
REPORT FOR 1991 AND 1992**

APRIL 1994



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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

ALVINSTON WATER TREATMENT PLANT 1991 AND 1992 REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

The Alvinston water treatment plant is a conventional treatment plant which treats water from the Sydenham River. The process consists of coagulation, flocculation, clarification (upflow solids contact clarifier), filtration, post pH adjustment and disinfection. Powder activated carbon is added for taste and odour control and pesticide removal. This plant has a design capacity of $0.77 \times 1000 \text{ m}^3/\text{day}$. The Alvinston water treatment plant serves a population of approximately 700.

Water at the plant and at three locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Alvinston water treatment plant, for the sample years of 1991 and 1992, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE	RAW			TREATED			RAILROAD ST N			LISGAR ST		
		TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL		24	22	91	8	1	12	5	1	20	2	0	0
CHEMISTRY (FIELD)		21	20	95	53	53	100	32	28	87	24	24	100
CHEMISTRY (LABORATORY)		235	224	95	240	187	77	210	189	90	106	95	89
METALS		240	120	50	240	98	40	230	113	49	138	65	47
CHLOROAROMATICS		112	0	0	112	0	0	42	0	0	42	0	0
CHLOROPHENOLS		23	0	0	23	0	0	.	.	.	.	.	.
PESTICIDES AND PCB		272	1	0	272	2	0	66	1	1	66	0	0
PHENOLICS		10	1	10	10	0	0	.	.	.	.	.	.
POLYAROMATIC HYDROCARBONS		50	0	0	50	0	0	17	0	0	16	0	0
SPECIFIC PESTICIDES		73	2	2	73	1	1	.	.	.	1	0	0
VOLATILES		300	0	0	300	39	13	147	20	13	91	12	13
RADIONUCLIDES		28	8	28	28	7	25	.	.	.	.	.	.
TOTAL		1,388	398		1,409	388		749	352		486	196	

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '0' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE	WPCP PLANT		
		TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL		1	0	0
CHEMISTRY (FIELD)		8	8	100
CHEMISTRY (LABORATORY)		42	40	95
METALS		46	24	52
CHLOROAROMATICS		14	0	0
PESTICIDES AND PCB		21	0	0
VOLATILES		31	4	12
TOTAL		163	76	

DRINKING WATER SURVEILLANCE PROGRAM

ALVINSTON WATER TREATMENT PLANT 1991 AND 1992 REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Alvinston water treatment plant in the summer of 1985 as part of the Alachlor pesticide study in Southwestern Ontario. Previous annual reports have been published for 1986, 1987, 1988, 1989 and 1990.

PLANT DESCRIPTION

The Alvinston water treatment plant is a conventional treatment plant which treats water from the Sydenham River. The process consists of coagulation, flocculation, clarification (upflow solids contact clarifier), filtration, post pH adjustment and disinfection. Powder activated carbon is added for taste and odour control and pesticide removal. This plant has a design capacity of $0.77 \times 1000 \text{ m}^3/\text{day}$. The Alvinston water treatment plant serves a population of approximately 700.

The sample day flows ranged from $0.18 \times 1000 \text{ m}^3/\text{day}$ to $0.27 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Stringent DWSP sampling protocols were followed to ensure that all samples were collected in a uniform manner (see Appendix B).

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

To obtain a representative raw water sample, free from any added chemicals, at plants which used chlorine for zebra mussel control, the operator was required to turn off the chlorine feed to the mouth of the intake and allow enough time for the chlorinated water to clear from the intake works.

Plant operating personnel routinely analyzed parameters for process control (Table 2).

At all distribution system locations, two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples, therefore, were laboratory chemistry and metals. The free flow sample represented fresh water from the distribution system main, since the sample tap was flushed for five minutes prior to sampling.

Water at the plant and at three locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between the raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary of all results by parameter and by water type. If a parameter was not detected, the total number of negative sample results is given. In contrast, if a parameter was detected at any location, the detailed results for all samples are provided.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment and Energy laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 4 and 5. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOS). These objectives are applied to the free flowing water. When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

The guidelines are evaluated on the results from the free flowing samples. Standing samples in the distribution system can show elevated concentrations in certain metals if the water is corrosive or if the standing time is excessive. Flushing the tap until the water achieves the coolest temperature will ensure that the water used for consumption will contain minimum concentrations of metals.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- THE TREATED AND DISTRIBUTED WATER;**
- ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE
GUIDELINE VALUES; AND**
- POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of delivered water may increase in the distribution system due to the warming effect of soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Aesthetic Objective of 15°C in 6 of 18 treated and distributed water samples with a maximum reported value of 21.5 °C.

CHEMISTRY (LABORATORY)

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions. Colour is measured in Hazen units (HZU).

Colour exceeded the ODWO Aesthetic Objective of 5 HZU in 1 of 18 treated and distributed water samples with a maximum reported value of 6.0 HZU.

Elevated conductivity is often associated with high hardness levels.

Conductivity exceeded the European Economic Community Aesthetic Guideline Level of 400 umho/cm in all 18 treated and distributed water samples with a maximum reported value of 710 umho/cm.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Recommended Operational Guideline of 80-100 mg/L in all 18 treated and distributed water samples with a maximum reported value of 323.0 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to measure the efficiency of the treatment process. The ODWOs indicate that a

useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant to avoid problems in the distribution system.

Aluminum exceeded the ODWO Recommended Operational Guideline of 100 ug/L in 10 of 19 treated and distributed water samples with a maximum reported value of 790 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

PESTICIDES AND PCB

Hexachlorocyclopentadiene was found at positive levels in 3 of the 6 treated and distributed water samples analyzed. The maximum observed level was 153.0 ng/L. This was below the United States Environmental Protection Agency Ambient Water Quality Criteria of 206,000 ng/L.

The number and concentration of pesticides detected in the raw water was considerably higher than in the treated water, indicating the effectiveness of the powder activated carbon.

PHENOLICS

The results of the phenolics test showed that none were detected above trace levels.

POLYAROMATIC HYDROCARBONS

The results of the polyaromatic hydrocarbon scan showed that none were detected.

SPECIFIC PESTICIDES

Dicamba was found at a positive level in 1 of the 4 treated and distributed water samples analyzed. The maximum observed level was 530 ng/L. This was below the QDWO Maximum Acceptable Concentration of 120,000 ng/L.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology. Trace levels of styrene are considered to be laboratory artifacts resulting from the sample shipping containers.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THM results are discussed. Starting in 1991, samples from the distribution system were quenched with sodium thiosulphate to stop the further production of THMs in the sample bottle. This provided a more representative estimation of the THMs consumed in tap water.

Total trihalomethanes were found at positive levels in all 19 treated and distributed water samples analyzed with a maximum level of 103.3 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

RADIOLOGICAL

RADIONUCLIDES

There are more than 200 radionuclides, some of which occur naturally and others which originate from the activities of society. The radionuclides currently of greater interest from a health view-point are tritium, strontium-90, iodine-131, cesium-137 and radium-226. The gross beta and gross alpha determinations are suitable for preliminary screening except for tritium which must be measured separately. Radionuclides are measured in becquerels per litre (Bq/L). No results were above the available guidelines.

CONCLUSIONS

The number of pesticides which were detected at the Alvinston water treatment plant indicates that this raw water source is adversely affected by agricultural activity. Continued addition of powder activated carbon is required to reduce the levels of these contaminants.

The results are similar to those found in previous years.

No known health related guidelines were exceeded.

The Alvinston water treatment plant, for the sample years of 1991 and 1992, produced good quality water and this was maintained in the distribution system.

FIGURE 1

ALVINSTON WATER TREATMENT PLANT

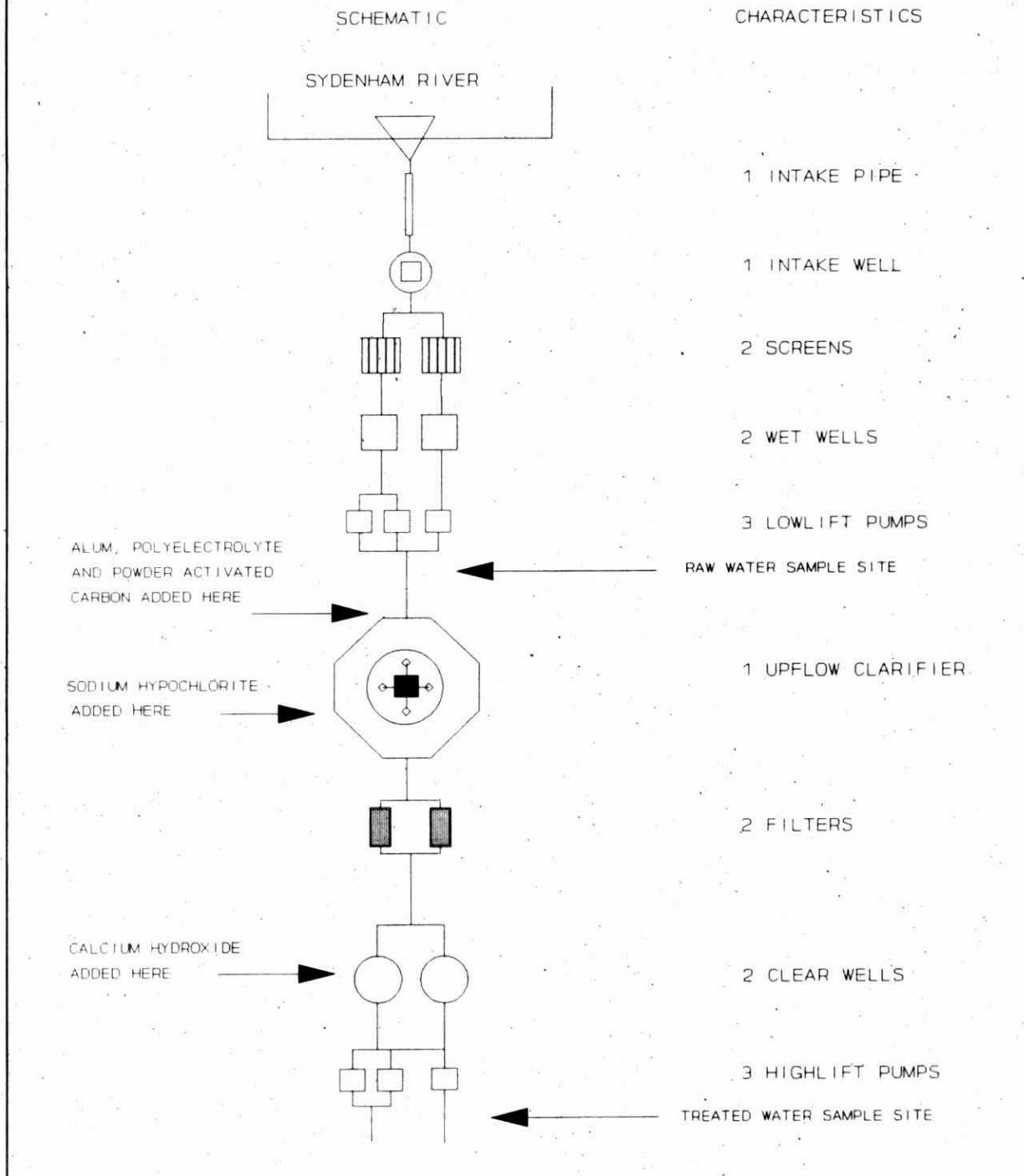


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

PLANT NAME: **ALVINSTON WTP**
WORKS #: **210001068**
UTM #: **174297004740900**

DISTRICT: **SARNIA**
REGION: **SOUTHWEST**
DISTRICT OFFICER: **O. WIGLE**

SUPERINTENDENT: **MR. TOM WRIGHT**

ADDRESS: **P.O. BOX 29
ALVINSTON, ONTARIO
N0N 1A0
519-898-2047**

MUNICIPALITY: **ALVINSTON**
AUTHORITY: **PROVINCIAL**

PLANT INFORMATION

PLANT VOLUME:	0.286	(X 1000 M3)
DESIGN CAPACITY:	0.775	(X 1000 M3/DAY)
RATED CAPACITY:	-	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
ALVINSTON	700

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
COMBINED CHLORINE RESIDUAL	TREATED	3 TIMES/DAY
TOTAL CHLORINE RESIDUAL	TREATED	3 TIMES/DAY
PH	RAW TREATED	DAILY DAILY
TEMPERATURE	TREATED	DAILY
TURBIDITY	TREATED	DAILY

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WTP SAMPLE DAY CONDITIONS
AND TREATMENT CHEMICAL DOSAGES FOR 1991 AND 1992

DATE	DELAY *	FLOW TIME(HRS) (1000M3)	COAGULATION ALUM LIQUID	COAGULATION AID POLYELECTROLYTE	TASTE & ODOUR ACTIVATED CARBON POWDER	POST CHLORINATION SODIUM HYPOCHLORITE	PH ADJUSTMENT CALCIUM HYDROXIDE
			.000	.04	7.00	3.00	15.00
91 FEB 19	.00	.000 46.00		.04	7.00	3.00	15.00
91 JUN 18	7.00	.272 76.00		.04	12.00	3.00	
91 AUG 20	7.00	.250 46.00		.04	5.00	2.50	10.40
91 OCT 22	7.00	.000 20.00		.04	5.00	3.00	20.00
91 NOV 19	7.00	.000 14.00		.04	5.00	2.00	40.00
92 FEB 18	.00	.000 20.00		.04	5.00	3.00	20.00
92 APR 28	7.00	.000 40.00		.04	10.00	3.00	
92 JUN 22	.00	.000 30.00		.04	12.00	3.00	
92 AUG 17	7.00	.177 14.00		.04	15.00	2.00	
92 DEC 15	7.00	.255 20.00		.04	5.00	1.50	

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

KEY TO TABLE 4 and 5

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
 - 1. Maximum Acceptable Concentration (MAC)
 - 1+. MAC for Total Trihalomethanes
 - 2. Interim Maximum Acceptable Concentration (IMAC)
 - 3. Aesthetic Objective (AO)
 - 3*. AO for Total Xylenes
 - 4. Recommended Operational Guideline
 - 5. Health Related Guidance Value

- B HEALTH & WELFARE CANADA (H&W)
 - 1. Maximum Acceptable Concentration (MAC)
 - 2. Proposed MAC
 - 3. Interim MAC
 - 4. Aesthetic Objective (AO)

- C WORLD HEALTH ORGANIZATION (WHO)
 - 1. Guideline Value (GV)
 - 2. Tentative GV
 - 3. Aesthetic GV

- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
 - 1. Maximum Contaminant Level (MCL)
 - 2. Suggested No-Adverse Effect Level (SNAEL)
 - 3. Lifetime Health Advisory
 - 4. EPA Ambient Water Quality Criteria

- F EUROPEAN ECONOMIC COMMUNITY (EEC)
 - 1. Health Related Guideline Level
 - 2. Aesthetic Guideline Level
 - 3. Maximum Admissible Concentration (MADC)

- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

- I NEW YORK STATE AMBIENT WATER GUIDELINE

- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

• No Sample Taken
BDL Below Minimum Measurement Amount
<T Greater Than Detection Limit But Not Confident
(SEE INTERPRETATION OF RESULTS ABOVE)
> Results Are Greater Than The Upper Limit
<=> Approximate Result
!48 No Data: Sample Age Exceeded 48 Hours
!AR No Data: No Numeric Results
!AW No Data: Analysis Withdrawn
!BT No Data: Sample Broken In Transit
!CS No Data: Contamination Suspected
!EF No Data: Laboratory Equipment Failure
!IR No Data: Insufficient Sample
!IS No Data: Insufficient Sample
!LA No Data: Laboratory Accident
!NP No Data: No Procedure
!NR No Data: Sample Not Received
!OP No Data: Obscured Plate
!PE No Data: Procedure Error: Sample Discarded
!PR No Data: Preservative Required
!QU No Data: Quality Control Unacceptable
!RE No Data: Received Empty
!RO No Data: No Numeric Results
!SM No Data: Sample Missing
!SS No Data: Sample Improperly Preserved
!U No Data: Sample Unsuitable For Analysis
!UB No Data: Bottle Broken
!UN No Data: Result Unreliable

!UR No Data: Unpreserved Sample Required
A Approximate Value
A3C Approximate, Total Count Exceeded 300 Colonies
A> Approximate Value, Exceeded Normal Range
APS Additional Peak, Less Than, Not Priority Pollutant
ARO Additional Information In Laboratory Report
CRO Calculated Result Only
NAF Not All Required Tests Found
RID Ioncal Calculated on Incomplete Data Set
RMP P and M-Xylene Not Separated
RRR Result Obtained by Repeat Analysis
RRV Rerun Verification
SFA Sample Filtered: Filtrate Analyzed
SIL Sample Incorrectly Labelled
SPS Several Peaks, Small, Not Priority Pollutant
U48 Unreliable: Sample Age Exceeded 48 Hours
UAL Unreliable: Sample Age Exceeded Limit
UAU Unreliable: Sample Age Unknown
UCS Unreliable: Contamination Suspected
WSD Wrong Sample Description On Bottle

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
BACTERIOLOGICAL							
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)			
1991 JUN	170	.	.	.	.	.	.
1991 AUG	210	.	.	.	.	.	.
1991 NOV	110	.	.	.	.	.	.
1992 FEB	730	.	.	.	.	.	.
1992 APR	60 <=>	.	.	.	.	.	.
1992 JUN	480	.	.	.	.	.	.
1992 AUG	180 A3C	.	.	.	.	.	.
1992 DEC	230	.	.	.	.	.	.
STANDRD PLATE CNT MF (CT/ML)		DET'N LIMIT = 0		GUIDELINE = 500 (A3)			
1991 JUN	.	1 <=>	11	.	.	.	.
1991 AUG	.	0 <=>	5 <=>	.	.	.	.
1991 OCT	.	.	0 <=>	.	.	.	.
1991 NOV	.	25	4 <=>	.	.	.	.
1992 FEB	.	5 <=>	1 <=>	.	.	.	.
1992 APR	.	0 <=>	.	.	.	0 <=>	.
1992 JUN	.	3 <=>	.	.	0 <=>	.	.
1992 AUG	.	3 <=>	.	.	.	.	.
1992 DEC	.	6 <=>	.	.	0 <=>	.	.
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML (A1)			
1991 JUN	2100 A3C	.	.	.	.	.	.
1991 AUG	1300 A3C	.	.	.	.	.	.
1991 NOV	900 <=>	.	.	.	.	.	.
1992 FEB	15000 >	.	.	.	.	.	.
1992 APR	3400 A3C	.	.	.	.	.	.
1992 JUN	1300 A3C	.	.	.	.	.	.
1992 AUG	7000 A3C	.	.	.	.	.	.
1992 DEC	50000 >	.	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A			
1991 JUN	78000 A3C	.	.	.	.	.	.
1991 AUG	54000 A3C	.	.	.	.	.	.
1991 NOV	21000	.	.	.	.	.	.
1992 FEB	15000 >	.	.	.	.	.	.
1992 APR	29000 A3C	.	.	.	.	.	.
1992 JUN	68000 A3C	.	.	.	.	.	.
1992 AUG	20000 A3C	.	.	.	.	.	.
1992 DEC	50000 >	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
CHEMISTRY (FIELD)							
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A			
1991 FEB		.100			.200	.200	
1991 JUN		.200					
1991 AUG		.200	.100	.100			
1991 OCT		.200	.200	.200			
1991 NOV		.100	.300	.300			
1992 FEB		.800	.300	.300			
1992 APR		.200				.200	.200
1992 JUN		.200			.200	.200	
1992 AUG		.200					
1992 DEC		.200			.200	.200	
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A			
1991 FEB		.300			.100	.100	
1991 JUN		1.400					
1991 AUG		.800	.000	.000			
1991 OCT		1.400	.500	.600			
1991 NOV		.600	.200	.200			
1992 FEB		.200	.000	.000			
1992 APR		.800				.400	.400
1992 JUN		1.000			.600	.600	
1992 AUG		1.300					
1992 DEC		.600			.300	.300	
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A			
1991 FEB		.400			.300	.300	
1991 JUN		1.600					
1991 AUG		1.000	.100	.100			
1991 OCT		1.600	.700	.800			
1991 NOV		.700	.500	.500			
1992 FEB		1.000	.300	.300			
1992 APR		1.000				.600	.600
1992 JUN		1.200			.800	.800	
1992 AUG		1.500					
1992 DEC		.800			.500	.500	
FLD PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)			
1991 FEB	7.300	7.300					
1992 JUN		7.100					
1992 DEC	8.120	7.660					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
CHEMISTRY (FIELD)							
FLD TEMPERATURE (DEG.C)		DET'N LIMIT = N/A		GUIDELINE = 15 (A3)			
1991 FEB	.000	2.000			6.000	6.000	
1991 JUN	21.500	21.000	16.000	16.000			
1991 AUG	20.000	21.500					
1991 OCT	10.000	8.000	16.000	11.000			
1991 NOV	6.000	6.000	10.000	10.000			
1992 FEB		1.000	6.000	6.000			
1992 APR	7.000	9.000					11.000
1992 JUN	15.000	14.000			17.000	17.000	
1992 AUG	17.000	17.000					
1992 DEC	4.200	4.400			9.000	9.000	
FLD TURBIDITY (FTU)							
		DET'N LIMIT = N/A		GUIDELINE = 1.0 (A1)			
1991 FEB	15.000	.150					
1991 JUN	68.000	.080					
1991 AUG	45.000	.100					
1991 OCT	6.000	.130					
1991 NOV	4.000	.130					
1992 FEB	28.000	.140					
1992 APR	35.000	.150					
1992 JUN	25.000	.130					
1992 AUG	40.000	.140					
1992 DEC	9.500	.120					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
CHEMISTRY (LABORATORY)							
ALKALINITY (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A4)		
1991 FEB	218.300	158.400	.		163.500	157.500	.
1991 JUN	226.700	148.100	189.300	187.400	.	.	.
1991 AUG	208.400	155.300	169.200	169.100	.	.	.
1991 OCT	219.700	185.700	187.900	184.600	.	.	.
1991 NOV	195.000	170.800	169.600	168.100	.	.	.
1992 FEB	150.700	139.500	199.500	201.200	.		
1992 APR	186.200	133.900	.	.		132.200	131.200
1992 JUN	222.200	172.700	.	.	173.800	167.100	.
1992 AUG	234.600	187.000	.	.	.	.	.
1992 DEC	241.400	217.600	.	.		214.400	.
CALCIUM (MG/L)	)		DET'N LIMIT = 0.20		GUIDELINE = 100 (F2)		
1991 FEB	94.600	81.800	.		83.300	84.500	.
1991 JUN	95.800	99.000	95.200	88.000	.	.	.
1991 AUG	80.000	86.000	91.400	91.200	.	.	.
1991 OCT	83.900	82.200	84.300	82.800	.	.	.
1991 NOV	77.700	77.900	78.100	78.300	.	.	.
1992 FEB	75.700	85.400	97.700	98.800	.		
1992 APR	81.900	78.900	.	.		78.600	81.250
1992 JUN	94.600	95.300	.	.	91.600	93.100	.
1992 AUG	98.900	94.750	.	.	.	.	.
1992 DEC	91.500	87.950	.	.		85.400	.
CYANIDE (MG/L)	)		DET'N LIMIT = 0.001		GUIDELINE = 0.2 (A1)		
15 SAMPLES	BDL	BDL	.	.	.	.	.
CHLORIDE (MG/L)	)		DET'N LIMIT = 0.20		GUIDELINE = 250 (A3)		
1991 FEB	24.000	25.000	.		25.300	24.800	.
1991 JUN	25.600	30.600	28.900	28.700	.	.	.
1991 AUG	23.100	26.600	28.600	29.100	.	.	.
1991 OCT	24.600	28.800	29.600	29.000	.	.	.
1991 NOV	28.300	29.000	29.100	29.000	.	.	.
1992 FEB	32.300	36.200	45.400	45.400	.		
1992 APR	23.800	25.800	.	.		25.500	25.300
1992 JUN	27.700	32.700	.	.	33.500	34.100	.
1992 AUG	26.800	30.700	.	.	.	.	.
1992 DEC	27.700	30.100	.	.		29.500	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
CHEMISTRY (LABORATORY)							
COLOUR (CHU)		DET'N LIMIT = 0.50		GUIDELINE = 5 (A3)			
1991 FEB	15.000	2.500	.	3.000	3.000	.	.
1991 JUN	3.000	BDL	2.000	2.000	.	.	.
1991 AUG	1.500	1.000 <T	1.000 <T	1.000 <T	.	.	.
1991 OCT	12.000	1.000 <T	1.500 <T	1.000	.	.	.
1991 NOV	8.500	BDL	BDL	.500 <T	.	.	.
1992 FEB	23.000	6.000	2.500	2.500	.	.	.
1992 APR	18.500	4.000	.	.	.	3.500	3.500
1992 JUN	19.500	.500 <T	.	1.500	1.000 <T	.	.
1992 AUG	22.500	1.000 <T	.	.	.	.	.
1992 DEC	15.500	3.000	.	.	2.000	.	.
CONDUCTIVITY (UMHO/CM)							
		DET'N LIMIT = 1.0		GUIDELINE = 400 (F2)			
1991 FEB	565	535	.	539	528	.	.
1991 JUN	606	668	641	637	.	.	.
1991 AUG	536	590	621	622	.	.	.
1991 OCT	569	594	604	598	.	.	.
1991 NOV	588	586	581	580	.	.	.
1992 FEB	553	619	710	706	.	.	.
1992 APR	542	550	.	.	.	545	544
1992 JUN	605	643	.	633	642	.	.
1992 AUG	619	632	.	.	.	.	.
1992 DEC	637	650	.	.	629	.	.
DISS ORG CARBON (MG/L)							
		DET'N LIMIT = 0.10		GUIDELINE = 5.0 (A3)			
1991 FEB	4.100	2.600	.	2.700	2.900	.	.
1991 JUN	4.300	2.000	2.400	2.600	.	.	.
1991 AUG	3.700	2.100	1.800	1.700	.	.	.
1991 OCT	3.000	2.300	2.200	2.800	.	.	.
1991 NOV	3.200	1.500	1.700	1.800	.	.	.
1992 FEB	5.700	3.900	2.700	2.400	.	.	.
1992 APR	5.900	3.700	.	.	.	3.400	3.500
1992 JUN	4.100	2.100	.	2.500	2.500	.	.
1992 AUG	6.200	2.700
1992 DEC	4.300	3.100	.	.	2.900	.	.

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DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
CHEMISTRY (LABORATORY)							
FLUORIDE (MG/L)	)		DET'N LIMIT = 0.01		GUIDELINE = 1.5 (A1)		
1991 FEB	.120	.120	.	.100	.120	.	.
1991 JUN	.120	.040 <T	.080	.080	.	.	.
1991 AUG	.100	.120	.100	.080	.	.	.
1991 OCT	.140	.120	.120	.120	.	.	.
1991 NOV	.100	.100	.100	.100	.	.	.
1992 FEB	.140	.120	.120	.120	.	.	.
1992 APR	.140	.080	.	.	.	.060	.060
1992 JUN	.120	.060	.	.	.060	.060	.
1992 AUG	.120	.060	.	.	.	.	.
1992 DEC	.120	.120	.	.	.100	.	.
HARDNESS (MG/L)							
	)		DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)		
1991 FEB	298.400	262.700	.	264.300	263.800	.	.
1991 JUN	315.000	322.000	313.000	292.000	.	.	.
1991 AUG	270.000	280.000	300.000	300.000	.	.	.
1991 OCT	287.800	281.600	287.700	283.800	.	.	.
1991 NOV	267.500	269.300	270.100	269.900	.	.	.
1992 FEB	244.000	268.000	323.000	325.000	.	.	.
1992 APR	263.000	251.000	.	.	.	252.100	258.000
1992 JUN	317.000	317.000	.	305.000	309.000	.	.
1992 AUG	317.780	303.250	.	.	.	.	.
1992 DEC	303.800	294.960	.	.	286.790	.	.
IONCAL (DMNSLESS)							
	)		DET'N LIMIT = N/A		GUIDELINE = N/A		
1991 FEB	1.404	.587	.	.623	1.218	.	.
1991 JUN	2.147 NAF	1.531 NAF	.549 NAF	5.207 NAF	.	.	.
1991 AUG	1.196	3.452	2.313	1.440	.	.	.
1991 OCT	1.729	2.420	1.972	3.264	.	.	.
1991 NOV	2.599 NAF	3.328 NAF	2.680 NAF	2.132 NAF	.	.	.
1992 FEB	2.605	2.562	.387	.556	.	.	.
1992 APR	4.256	4.227	.	.	.	4.011	2.070
1992 JUN	1.585	2.453	.	.058	.035	.	.
1992 AUG	2.793	1.528	.	.	.	.	.
1992 DEC	4.783	6.125	.	.000 NAF	5.343	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
CHEMISTRY (LABORATORY)							
POTASSIUM (MG/L)		DET'N LIMIT = 0.01		GUIDELINE = 10 (F2)			
1991 FEB	2.530	2.550		2.690	2.780		
1991 JUN	3.300	3.000	2.750	2.700			
1991 AUG	3.100	2.650	2.600	2.700			
1991 OCT	2.700	2.710	2.830	2.970			
1991 NOV	2.710	2.500	2.460	2.480			
1992 FEB	3.940	3.440	3.000	2.930			
1992 APR	3.230	3.104				3.143	3.185
1992 JUN	2.780	2.870		2.980	3.070		
1992 AUG	4.344	3.573					
1992 DEC	3.143	3.022			3.131		
LANGELIERS INDEX (DMNSLESS)							
		DET'N LIMIT = N/A		GUIDELINE = N/A			
1991 FEB	1.098	1.028		.979	.961		
1991 JUN	1.216	.671	.902	.944			
1991 AUG	1.148	1.026	.967	.996			
1991 OCT	1.268	1.164	1.119	1.064			
1991 NOV	1.191	1.135	1.103	1.101			
1992 FEB	.961	1.034	1.243	1.242			
1992 APR	1.038	.498				.411	.443
1992 JUN	1.272	.843			.809	.869	
1992 AUG	1.313	1.026					
1992 DEC	1.201	.928				.980	
MAGNESIUM (MG/L)							
		DET'N LIMIT = 0.1		GUIDELINE = 30.0 (F2)			
1991 FEB	15.100	14.200		13.650	12.850		
1991 JUN	18.300	18.300	18.200	17.600			
1991 AUG	17.000	15.900	17.400	17.600			
1991 OCT	19.050	18.550	18.750	18.750			
1991 NOV	17.850	18.150	18.250	18.050			
1992 FEB	13.500	13.300	19.200	19.000			
1992 APR	14.100	13.140				13.500	13.260
1992 JUN	19.600	19.230		18.500	18.500		
1992 AUG	17.220	16.200					
1992 DEC	18.300	18.300			17.880		

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CHEMISTRY (LABORATORY)							
SODIUM (MG/L)			DET'N LIMIT = 0.20		GUIDELINE = 200 (A4)		
1991 FEB	9.200	10.700			11.400	10.800	
1991 JUN	11.000	16.200	14.000	14.000			
1991 AUG	11.200	15.200	15.200	16.200			
1991 OCT	11.400	16.000	16.000	14.900			
1991 NOV	14.100	14.900	14.800	15.000			
1992 FEB	12.900	16.700	22.200	22.100			
1992 APR	8.950	11.560				11.440	11.460
1992 JUN	12.400	16.100			16.400	16.600	
1992 AUG	10.890	15.490					
1992 DEC	11.730	14.150			13.740		
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)		
1991 FEB	.070	.004 <T			.004 <T	.014	
1991 JUN	.014	BDL	.002 <T	BDL			
1991 AUG	.016	BDL	BDL	.010			
1991 OCT	.002 <T	BDL	BDL	.024			
1991 NOV	BDL	.002 <T	.004 <T	.004 <T			
1992 FEB	.282	.020	.040	.032			
1992 APR	.002 <T	.014				.014	.012
1992 JUN	.012	BDL			BDL	BDL	
1992 AUG	.008 <T	.002 <T					
1992 DEC	.084	.002 <T				.022	
NITRITE (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1.0 (A1)		
1991 FEB	.026	BDL			.001 <T	.001 <T	
1991 JUN	.031	BDL	.002 <T	.002 <T			
1991 AUG	.014	BDL	BDL	BDL			
1991 OCT	.007	BDL	BDL	.002 <T			
1991 NOV	.011	BDL	.001 <T	.001 <T			
1992 FEB	.050	.003 <T	.001 <T	.001 <T			
1992 APR	.086	.002 <T				.003 <T	.003 <T
1992 JUN	.043	BDL			.001 <T	BDL	
1992 AUG	.024	BDL					
1992 DEC	.033	BDL				.001 <T	

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CHEMISTRY (LABORATORY)							
NITRATE (TOTAL) (MG/L)			DET'N LIMIT = 0.005		GUIDELINE = 10.0 (A1)		
1991 FEB	5.750	5.560	.	.	5.580	5.360	.
1991 JUN	5.000	4.740	4.840	4.570	.	.	.
1991 AUG	1.900	1.680	1.680	1.770	.	.	.
1991 OCT	1.790	1.820	1.790	1.790	.	.	.
1991 NOV	2.350	2.480	2.550	2.550	.	.	.
1992 FEB	9.900	9.680	6.720	6.700	.	.	.
1992 APR	7.630	7.880	.	.	.	7.800	7.800
1992 JUN	5.430	6.180	.	.	5.880	6.930	.
1992 AUG	4.760	3.330	.	.	.	.	.
1992 DEC	4.470	4.530	.	.	4.190	.	.
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02		GUIDELINE = N/A		
1991 FEB	.720	.330	.	.	.420	.390	.
1991 JUN	.900	.140	.290	.280	.	.	.
1991 AUG	.630	.120	.120	.120	.	.	.
1991 OCT	.360	.150	.150	.210	.	.	.
1991 NOV	.480	.190	.230	.220	.	.	.
1992 FEB	.870	.460	.370	.340	.	.	.
1992 APR	.890	.460	.	.	.	.460	.460
1992 JUN	.720	.260	.	.	.340	.310	.
1992 AUG	.980	.240	.	.	.	.	.
1992 DEC	.700	.400	.	.	.	.380	.
PH (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)		
1991 FEB	8.250	8.380	.	.	8.310	8.300	.
1991 JUN	8.350	7.980	8.120	8.200	.	.	.
1991 AUG	8.390	8.370	8.250	8.280	.	.	.
1991 OCT	8.470	8.450	8.390	8.350	.	.	.
1991 NOV	8.480	8.480	8.450	8.450	.	.	.
1992 FEB	8.370	8.430	8.430	8.420	.	.	.
1992 APR	8.320	7.940	.	.	.	7.860	7.880
1992 JUN	8.420	8.100	.	.	8.080	8.150	.
1992 AUG	8.420	8.250
1992 DEC	8.330	8.120	.	.	8.190	.	.

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DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

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CHEMISTRY (LABORATORY)							
PHOSPHORUS FIL REACT (MG/L)							
				DET'N LIMIT = 0.0005	GUIDELINE = N/A		
1991 FEB	.046	.002	.	.	.	.	.
1991 JUN	.046	.000 <T	.	.	.	.	.
1991 AUG	.021	.000 <T	.	.	.	.	.
1991 OCT	.002 <T	BDL	.	.	.	.	.
1991 NOV	.002	.000 <T	.	.	.	.	.
1992 FEB	.078	.001 <T	.	.	.	.	.
1992 APR	.037	BDL	.	.	.	.	.
1992 JUN	.007	BDL	.	.	.	.	.
1992 AUG	.054	BDL	.	.	.	.	.
1992 DEC	.034	BDL	.	.	.	.	.
PHOSPHORUS TOTAL (MG/L)							
				DET'N LIMIT = 0.002	GUIDELINE = 0.40 (F2)		
1991 FEB	.074	.005 <T	.	.	.	.	.
1991 JUN	.179	.010	.	.	.	.	.
1991 AUG	.126	BDL	.	.	.	.	.
1991 OCT	.009 <T	.002 <T	.	.	.	.	.
1991 NOV	.024	.004 <T	.	.	.	.	.
1992 FEB	.147	.007 <T	.	.	.	.	.
1992 APR	.105	.002 <T	.	.	.	.	.
1992 JUN	.081	.002 <T	.	.	.	.	.
1992 AUG	.141	.025	.	.	.	.	.
1992 DEC	.061	.004 <T	.	.	.	.	.
RESIDUE FILTRATE (MG/L)							
				DET'N LIMIT = N/A	GUIDELINE = 500 (A3)		
1991 FEB	367.000 CRO	348.000 CRO	.	.	350.000 CRO	343.000 CRO	.
1991 JUN	394.000 CRO	434.000 CRO	417.000 CRO	414.000 CRO	.	.	.
1991 AUG	348.000 CRO	384.000 CRO	404.000 CRO	404.000 CRO	.	.	.
1991 OCT	370.000 CRO	386.000 CRO	393.000 CRO	389.000 CRO	.	.	.
1991 NOV	382.000 CRO	381.000 CRO	378.000 CRO	377.000 CRO	.	.	.
1992 FEB	359.000 CRO	402.000 CRO	461.000 CRO	459.000 CRO	.	.	.
1992 APR	352.000 CRO	358.000 CRO	.	.	354.000 CRO	354.000 CRO	.
1992 JUN	393.000 CRO	418.000 CRO	.	.	411.000 CRO	417.000 CRO	.
1992 AUG	402.000 CRO	411.000 CRO
1992 DEC	414.000	422.000	.	.	409.000	.	.

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CHEMISTRY (LABORATORY)							
SULPHATE (MG/L)		DET'N LIMIT = 0.20		GUIDELINE = 500 (A3)			
1991 FEB	42.870	74.230			72.050	72.740	
1991 JUN	52.590	142.000	93.420	94.850			
1991 AUG	51.670	123.500	123.260	122.140			
1991 OCT	58.300	90.890	92.530	94.740			
1991 NOV	63.390	90.520	90.050	90.150			
1992 FEB	52.060	87.770	85.490	86.070			
1992 APR	49.170	89.890					
1992 JUN	58.820	102.090			98.360	104.180	
1992 AUG	46.240	90.370					
1992 DEC	50.960	70.560				64.250	
TURBIDITY (FTU)							
		DET'N LIMIT = 0.05		GUIDELINE = 1.0 (A1)			
1991 FEB	18.500 RRV	.320			.580	.400	
1991 JUN	65.000	.090	.200	.200			
1991 AUG	45.000	.240	.240	.330			
1991 OCT	6.400	.260	.250	.270			
1991 NOV	7.000	.460	.340	.420			
1992 FEB	31.000	.250	.400	.300			
1992 APR	49.000	.290					.320
1992 JUN	43.000	.280			.280	.240 <T	
1992 AUG	60.000	.300					
1992 DEC	11.500	.230 <T				.560	

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METALS							
SILVER (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A			
38 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)							
		DET'N LIMIT = 0.10		GUIDELINE = 100 (A4)			
1991 FEB	210.000	660.000	.	500.000	490.000	.	.
1991 JUN	670.000	29.000	50.000	52.000	.	.	.
1991 AUG	450.000	790.000	360.000	290.000	.	.	.
1991 OCT	110.000	550.000	470.000	380.000	.	.	.
1991 NOV	100.000	530.000	520.000	500.000	.	.	.
1992 FEB	400.000	180.000	190.000	200.000	.	.	.
1992 APR	440.000	32.000	.	.	34.000	34.000	.
1992 JUN	240.000	34.000	.	58.000	51.000	.	.
1992 AUG	420.000	48.000	.	.	.	.	.
1992 DEC	160.000	60.000	.	59.000	57.000	.	.
ARSENIC (UG/L)							
		DET'N LIMIT = 0.10		GUIDELINE = 25 (A1)			
1991 FEB	.680 <T	BDL	.	BDL	.150 <T	.	.
1991 JUN	1.200	BDL	.360 <T	.190 <T	.	.	.
1991 AUG	1.500	.390 <T	.360 <T	.440 <T	.	.	.
1991 OCT	1.100	.630 <T	.500 <T	.440 <T	.	.	.
1991 NOV	1.000 <T	.460 <T	.600 <T	.600 <T	.	.	.
1992 FEB	.710 <T	.370 <T	.510 <T	.390 <T	.	.	.
1992 APR	.670 <T	.380 <T	.	.	.310 <T	.380 <T	.
1992 JUN	1.200	BDL	.	.160 <T	.190 <T	.	.
1992 AUG	1.500	.350 <T	.	.	.	.	.
1992 DEC	.670 <T	.310 <T	.	.360 <T	.430 <T	.	.
BARIUM (UG/L)							
		DET'N LIMIT = 0.05		GUIDELINE = 1000 (A2)			
1991 FEB	34.000	15.000	.	16.000	17.000	.	.
1991 JUN	56.000	54.000	43.000	45.000	.	.	.
1991 AUG	53.000	33.000	37.000	38.000	.	.	.
1991 OCT	43.000	22.000	27.000	29.000	.	.	.
1991 NOV	47.000	22.000	21.000	20.000	.	.	.
1992 FEB	34.000	17.000	28.000	31.000	.	.	.
1992 APR	40.000	32.000	.	.	35.000	35.000	.
1992 JUN	55.000	49.000	.	51.000	49.000	.	.
1992 AUG	55.000	45.000
1992 DEC	42.000	25.000	.	28.000	29.000	.	.

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METALS							
BORON (UG/L)			DET'N LIMIT = 2.00		GUIDELINE = 5000 (A1)		
1991 FEB	28.000	39.000			40.000	36.000	
1991 JUN	33.000	37.000	37.000	31.000			
1991 AUG	49.000	54.000	45.000	41.000			
1991 OCT	42.000	45.000	49.000	49.000			
1991 NOV	46.000	58.000	56.000	55.000			
1992 FEB	21.000	27.000	34.000	36.000			
1992 APR	25.000	39.000				29.000	31.000
1992 JUN	38.000	50.000			50.000	50.000	
1992 AUG	100.000	98.000					
1992 DEC	30.000	33.000			37.000	49.000	
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 6800 (D4)		
1991 FEB	.080 <T	BDL			BDL	BDL	
1991 JUN	.060 <T	BDL	BDL	BDL			
1991 AUG	.090 <T	BDL	.090 <T	.080 <T			
1991 OCT	.060 <T	BDL	.070 <T	.070 <T			
1991 NOV	BDL	BDL	BDL	BDL			
1992 FEB	BDL	BDL	BDL	BDL			
1992 APR	BDL	BDL				BDL	BDL
1992 JUN	BDL	.060 <T			BDL	.070 <T	
1992 AUG	.140 <T	BDL					
1992 DEC	BDL	BDL			BDL	BDL	
CADMIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5.0 (A1)		
1991 FEB	BDL	BDL			BDL	BDL	
1991 JUN	BDL	BDL	BDL	BDL			
1991 AUG	BDL	BDL	BDL	BDL			
1991 OCT	BDL	BDL	BDL	BDL			
1991 NOV	BDL	BDL	BDL	BDL			
1992 FEB	BDL	BDL	BDL	BDL			
1992 APR	BDL	BDL				.070 <T	BDL
1992 JUN	.090 <T	BDL			BDL	.090 <T	
1992 AUG	.060 <T	BDL					
1992 DEC	BDL	BDL			BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
METALS							
COBALT (UG/L)				DET'N LIMIT = 0.02	GUIDELINE = N/A		
1991 FEB	.330 <T	.190 <T			.230 <T	.250 <T	
1991 JUN	.830 <T	.050 <T	BDL	BDL			
1991 AUG	.850 <T	.140 <T	.170 <T	.160 <T			
1991 OCT	.320 <T	.210 <T	.100 <T	.150 <T			
1991 NOV	.640 <T	.110 <T	.190 <T	.080 <T			
1992 FEB	.640 <T	.360 <T	.360 <T	.370 <T			
1992 APR	.640 <T	.250 <T				.260 <T	.260 <T
1992 JUN	.970 <T	.590 <T			.580 <T	.720 <T	
1992 AUG	.670 <T	.310 <T					
1992 DEC	.250 <T	.130 <T			.070 <T	.070 <T	
CHROMIUM (UG/L)				DET'N LIMIT = 0.50	GUIDELINE = 50.0 (A1)		
1991 FEB	4.200 <T	2.800 <T			3.100 <T	1.600 <T	
1991 JUN	1.500 <T	BDL	3.100 <T	BDL			
1991 AUG	3.800 <T	2.900 <T	1.600 <T	1.100 <T			
1991 OCT	7.200	6.000	6.600	6.000			
1991 NOV	4.500 <T	3.800 <T	4.200 <T	4.200 <T			
1992 FEB	.930 <T	BDL	BDL	BDL			
1992 APR	.710 <T	2.900 <T				BDL	BDL
1992 JUN	.690 <T	BDL			BDL	BDL	
1992 AUG	8.100	6.100					
1992 DEC	3.000 <T	3.400 <T			1.800 <T	6.000	
COPPER (UG/L)				DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
1991 FEB	2.400 <T	.920 <T			1.300 <T	4.100 <T	
1991 JUN	3.100 <T	1.000 <T	14.000	16.000			
1991 AUG	2.100 <T	.870 <T	9.600	16.000			
1991 OCT	1.000 <T	.690 <T	4.700 <T	16.000			
1991 NOV	1.100 <T	.590 <T	6.400	5.600			
1992 FEB	2.400 <T	1.200 <T	5.100	12.000			
1992 APR	2.400 <T	1.400 <T				6.900	7.400
1992 JUN	2.200 <T	1.100 <T			5.900	6.100	
1992 AUG	2.800 <T	1.700 <T					
1992 DEC	1.600 <T	1.100 <T			2.700 <T	3.400 <T	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST. FREE FLOW	DIST. SYSTEM RAILROAD ST. STANDING	DIST. SYSTEM LISGAR ST. FREE FLOW	DIST. SYSTEM LISGAR ST. STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
METALS							
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)			
1991 FEB	240.000	BDL			BDL	BDL	
1991 JUN	1100.000	BDL	BDL	BDL			
1991 AUG	770.000	27.000 <T	9.800 <T	18.000 <T			
1991 OCT	180.000	BDL	BDL	11.000 <T			
1991 NOV	210.000	BDL	8.300 <T	18.000 <T			
1992 FEB	500.000	6.100 <T	BDL	BDL			
1992 APR	600.000	15.000 <T				BDL	BDL
1992 JUN	390.000	BDL			9.000 <T	BDL	
1992 AUG	490.000	BDL					
1992 DEC	280.000	7.000 <T			8.400 <T	7.200 <T	
MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1.0 (A1)			
1991 FEB	.030 <T	BDL					
1991 JUN	BDL	BDL					
1991 AUG	BDL	BDL					
1991 OCT	BDL	BDL					
1991 NOV	BDL	BDL					
1992 FEB	BDL	BDL					
1992 APR	BDL	BDL					
1992 JUN	BDL	BDL					
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL					
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50.0 (A3)			
1991 FEB	27.000	1.400			1.600	1.300	
1991 JUN	120.000	2.500	1.600	1.400			
1991 AUG	110.000	.690	.790	.880			
1991 OCT	21.000	.650	.470 <T	.680			
1991 NOV	20.000	.520	.520	.810			
1992 FEB	30.000	3.100	1.300	1.400			
1992 APR	41.000	3.900				3.600	3.600
1992 JUN	85.000	1.700			1.700	1.400	
1992 AUG	58.000	1.100					
1992 DEC	37.000	2.500			2.200	2.200	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
METALS							
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = N/A		
1991 FEB	.330 <T	.850			.720	.700	
1991 JUN	.300 <T	1.000	1.100	1.100			
1991 AUG	.230 <T	1.000	.980	.960			
1991 OCT	.550	.890	.840	.890			
1991 NOV	.620	.900	.940	.860			
1992 FEB	.400 <T	.950	.830	.850			
1992 APR	.310 <T	.930					.970
1992 JUN	.730	1.400			1.400	1.400	
1992 AUG	.490 <T	1.500					
1992 DEC	.490 <T	.730			.730	.810	
NICKEL (UG/L)							
			DET'N LIMIT = 0.20		GUIDELINE = 350 (D3)		
1991 FEB	.480 <T	.330 <T			.600 <T	BDL	
1991 JUN	BDL	BDL	BDL	BDL			
1991 AUG	3.000	1.800 <T	1.500 <T	1.400 <T			
1991 OCT	1.300 <T	1.000 <T	.720 <T	.760 <T			
1991 NOV	.670 <T	.470 <T	BDL	BDL			
1992 FEB	3.100	2.200	2.400	2.600			
1992 APR	2.900	2.000 <T					2.600
1992 JUN	3.600	2.800			3.900	3.500	
1992 AUG	2.400	1.500 <T					
1992 DEC	2.900	2.800			2.400	2.800	
LEAD (UG/L)							
			DET'N LIMIT = 0.05		GUIDELINE = 10 (A1)		
1991 FEB	.450 <T	BDL			.080 <T	.290 <T	
1991 JUN	2.300	.060 <T	.570	.920			
1991 AUG	1.500	.080 <T	.550	1.000			
1991 OCT	.340 <T	BDL	.320 <T	1.300			
1991 NOV	.260 <T	BDL	.430 <T	.420 <T			
1992 FEB	.660	BDL	.430 <T	2.300			
1992 APR	.990	.060 <T					.330 <T
1992 JUN	.970	.070 <T			.350 <T	.430 <T	
1992 AUG	1.200	BDL					
1992 DEC	.310 <T	BDL			.180 <T	.180 <T	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
METALS							
ANTIMONY (UG/L)		DET'N LIMIT = 0.05					GUIDELINE = 146 (D4)
1991 FEB	.360 <T	.470 <T	.	.	.470 <T	.500 <T	.
1991 JUN	.230 <T	.460 <T	.400 <T	.490 <T	.	.	.
1991 AUG	.280 <T	.360 <T	.460 <T	.430 <T	.	.	.
1991 OCT	.500 <T	.360 <T	.380 <T	.680	.	.	.
1991 NOV	.390 <T	.400 <T	.580	.480 <T	.	.	.
1992 FEB	.460 <T	.720	.590	.630	.	.	.
1992 APR	.190 <T	.380 <T	.	.	.	.380 <T	.330 <T
1992 JUN	.230 <T	.290 <T	.	.	.330 <T	.320 <T	.
1992 AUG	.260 <T	.260 <T	.	.	.	.	.
1992 DEC	.360 <T	.350 <T	.	.	.400 <T	.470 <T	.
SELENIUM (UG/L)		DET'N LIMIT = 1.00					GUIDELINE = 10 (A1)
1991 FEB	BDL	BDL	.	.	1.100 <T	BDL	.
1991 JUN	BDL	2.000 <T	1.700 <T	2.000 <T	.	.	.
1991 AUG	1.100 <T	1.100 <T	BDL	BDL	.	.	.
1991 OCT	BDL	1.100 <T	1.600 <T	1.500 <T	.	.	.
1991 NOV	BDL	1.100 <T	1.200 <T	1.700 <T	.	.	.
1992 FEB	1.100 <T	1.200 <T	1.200 <T	1.500 <T	.	.	.
1992 APR	BDL	2.200 <T	.	.	.	BDL	1.800 <T
1992 JUN	BDL	1.400 <T	.	.	1.200 <T	1.700 <T	.
1992 AUG	BDL	1.400 <T	.	.	.	.	.
1992 DEC	BDL	BDL	.	.	BDL	1.200 <T	.
STRONTIUM (UG/L)		DET'N LIMIT = 0.10					GUIDELINE = N/A
1991 FEB	200.000	160.000	.	.	160.000	170.000	.
1991 JUN	200.000	200.000	190.000	190.000	.	.	.
1991 AUG	180.000	160.000	180.000	190.000	.	.	.
1991 OCT	190.000	170.000	180.000	170.000	.	.	.
1991 NOV	210.000	190.000	190.000	190.000	.	.	.
1992 FEB	170.000	160.000	200.000	210.000	.	.	.
1992 APR	180.000	170.000	.	.	.	170.000	170.000
1992 JUN	270.000	260.000	.	.	260.000	260.000	.
1992 AUG	230.000	210.000	.	.	.	.	.
1992 DEC	240.000	220.000	.	.	210.000	220.000	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LTSGAR ST FREE FLOW	DIST. SYSTEM LTSGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
METALS							
TITANIUM (UG/L)	)		DET'N LIMIT = 0.50		GUIDELINE = N/A		
1991 FEB	17.000	6.700			6.700	6.400	
1991 JUN	10.000	5.100	4.800 <T	5.000 <T			
1991 AUG	5.700	3.100 <T	2.900 <T	3.300 <T			
1991 OCT	6.100	2.700 <T	2.700 <T	2.600 <T			
1991 NOV	5.600	2.400 <T	2.600 <T	2.800 <T			
1992 FEB	10.000	4.300 <T	5.300	5.700			
1992 APR	17.000	12.000				12.000	13.000
1992 JUN	22.000	16.000			15.000	15.000	
1992 AUG	22.000	13.000					
1992 DEC	5.800	3.500 <T			3.400 <T	3.400 <T	
THALLIUM (UG/L)							
THALLIUM (UG/L)	)		DET'N LIMIT = 0.05		GUIDELINE = 13 (D4)		
38 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
URANIUM (UG/L)							
URANIUM (UG/L)	)		DET'N LIMIT = 0.05		GUIDELINE = 100 (A1)		
1991 FEB	1.600	1.300			1.300	1.300	
1991 JUN	1.200	.220 <T	.760	.730			
1991 AUG	1.100	.720	.680	.600			
1991 OCT	1.100	1.200	1.100	1.100			
1991 NOV	1.100	.930	.890	.880			
1992 FEB	1.200	1.100	1.700	1.800			
1992 APR	1.700	.650				.580	.580
1992 JUN	1.800	.690			.810	.640	
1992 AUG	2.000	.990					
1992 DEC	1.500	1.600			1.300	1.300	
VANADIUM (UG/L)							
VANADIUM (UG/L)	)		DET'N LIMIT = 0.05		GUIDELINE = N/A		
1991 FEB	.770	2.600			2.400	2.700	
1991 JUN	2.300	1.700	2.300	2.300			
1991 AUG	2.200	3.900	3.500	3.300			
1991 OCT	.810	2.200	2.300	2.300			
1991 NOV	.360 <T	1.900	2.100	2.000			
1992 FEB	1.000	1.600	1.100	1.200			
1992 APR	1.100	1.300				1.100	1.100
1992 JUN	1.600	2.000			1.900	1.600	
1992 AUG	1.700	1.900					
1992 DEC	.630	1.200			1.200	1.200	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
METALS							
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)			
1991 FEB	4.800	3.600	.	3.500	4.600	.	.
1991 JUN	8.800	4.200	3.700	9.700	.	.	.
1991 AUG	5.400	1.000 <T	2.200	3.500	.	.	.
1991 OCT	1.800 <T	1.400 <T	1.700 <T	3.800	.	.	.
1991 NOV	3.500	3.200	3.900	4.100	.	.	.
1992 FEB	6.300	2.800	3.900	6.500	.	.	.
1992 APR	7.400	3.200	.	.	.	5.800	5.800
1992 JUN	5.400	4.600	.	8.800	8.600	.	.
1992 AUG	6.600	4.500	.	.	.	.	.
1992 DEC	3.800	2.500	.	3.100	2.700	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
CHLOROAROMATICS							
HEXACHLOROBUTADIENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 450 (D4)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
123-TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1234-TETCLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = N/A			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1235-TETCLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = N/A			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
124-TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 10000 (I)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1245-TETCLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 38000 (D4)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
135-TRICHLOROBENZENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A			
1991 FEB	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 AUG	IAW	IAW	IAW	BDL	BDL	BDL	BDL
1991 OCT	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 FEB	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 APR	BDL	25.000 <T	BDL	BDL	BDL	19.000 <T	BDL
1992 JUN	INR	BDL	BDL	BDL	BDL	BDL	BDL
1992 AUG	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 DEC	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HEXACHLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 10 (C1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
CHLOROAROMATICS							
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)		
1991 FEB	BDL	BDL			BDL		
1991 JUN	BDL	BDL	BDL				
1991 AUG	!AW	!AW	!AW				
1991 OCT	BDL	BDL	BDL				
1991 NOV	BDL	BDL	BDL				
1992 FEB	BDL						
1992 APR	BDL	6.000 <T				6.000 <T	
1992 JUN	!NR	BDL			BDL		
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL			BDL		
OCTACHLOROSTYRENE (NG/L)							
			DET'N LIMIT = 1.000		GUIDELINE = N/A		
23 SAMPLES	BDL	BDL	BDL		BDL		BDL
PENTACHLOROBENZENE (NG/L)							
			DET'N LIMIT = 1.000		GUIDELINE = 74000 (D4)		
23 SAMPLES	BDL	BDL	BDL		BDL		BDL
236-TRICHLOROTOLUENE (NG/L)							
			DET'N LIMIT = 5.000		GUIDELINE = N/A		
23 SAMPLES	BDL	BDL	BDL		BDL		BDL
245-TRICHLOROTOLUENE (NG/L)							
			DET'N LIMIT = 5,000		GUIDELINE = N/A		
23 SAMPLES	BDL	BDL	BDL		BDL		BDL
26A-TRICHLOROTOLUENE (NG/L)							
			DET'N LIMIT = 5.000		GUIDELINE = N/A		
23 SAMPLES	BDL	BDL	BDL		BDL		BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
CHLOROPHENOLS							
234-TRICHLOROPHENOL (NG/L)			DET'N LIMIT = 100.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL					
2345-TETCHLOROPHENOL (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL					
2356-TETCHLOROPHENOL (NG/L)			DET'N LIMIT = 10.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL					
245-TRICHLOROPHENOL (NG/L)			DET'N LIMIT = 100.0		GUIDELINE = 2600000 (D4)		
8 SAMPLES	BDL	BDL					
246-TRICHLOROPHENOL (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = 5000 (A1)		
8 SAMPLES	BDL	BDL					
PENTACHLOROPHENOL (NG/L)			DET'N LIMIT = 10.00		GUIDELINE = 60000 (A1)		
6 SAMPLES	BDL	BDL					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
PESTICIDES AND PCB							
ALDRIN (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 700 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ALPHA BHC (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 700 (G)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
BETA BHC (NG/L)		DET'N LIMIT = 1.00		GUIDELINE = 300 (G)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
LINDANE (GAMMA BHC) (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 4000 (A1)			
1991 FEB	BDL	BDL		BDL			
1991 JUN	1.000 <T	BDL	BDL				
1991 AUG	!AW	!AW	!AW				
1991 OCT	BDL	BDL	BDL				
1991 NOV	BDL	BDL	BDL				
1992 FEB	BDL						
1992 APR	BDL	BDL				BDL	
1992 JUN	!NR	BDL		BDL			
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL		BDL			
ALPHA CHLORDANE (NG/L)		DET'N LIMIT = 2.000		GUIDELINE = 7000 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
GAMMA CHLORDANE (NG/L)		DET'N LIMIT = 2.00		GUIDELINE = 7000 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DIELDRIN (NG/L)		DET'N LIMIT = 2.00		GUIDELINE = 700 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
METHOXYCHLOR (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = 900000 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ENDOSULFAN 1 (NG/L)		DET'N LIMIT = 2.00		GUIDELINE = 74000 (D4)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ENDOSULFAN II (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 74000 (D4)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
PESTICIDES AND PCB							
ENDRIN (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 1600 (D3)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ENDOSULFAN SULPHATE (NG/L)			DET'N LIMIT = 5.00	GUIDELINE = N/A			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HEPTACHLOR EPOXIDE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 3000 (A1)			
13 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	1 QU
HEPTACHLOR (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 3000 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MIREX (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OXYCHLORDANE (NG/L)			DET'N LIMIT = 2.000	GUIDELINE = N/A			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
O,P-DDT (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 30000 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
PCB (NG/L)			DET'N LIMIT = 20.00	GUIDELINE = 3000 (A2)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
P,P-DDD (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 30000 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
P,P-DDE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 30000 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
P,P-DDT (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 30000 (A1)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
TOXAPHENE (NG/L)			DET'N LIMIT = 500.0	GUIDELINE = 5000 (A1)			
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
PESTICIDES AND PCB							
AMETRINE (NG/L)	)		DET'N LIMIT = 50.0		GUIDELINE = 300000 (D3)		
16 SAMPLES		BDL	BDL				
ATRAZINE (NG/L)	)		DET'N LIMIT = 50.0		GUIDELINE = 60000 (A2)		
1991 FEB	400.000 <T	BDL					
1991 JUN	2270.000	500.000 <T					
1991 AUG	!AW	!AW					
1991 OCT	!AW	!AW					
1991 NOV	BDL	BDL					
1992 FEB	432.000 <T	130.000 <T					
1992 APR	270.000 <T	140.000 <T					
1992 JUN	420.000 <T	BDL					
1992 AUG	310.000 <T	BDL					
1992 DEC	210.000 <T	BDL					
ATRATONE (NG/L)	)		DET'N LIMIT = 50.0		GUIDELINE = N/A		
16 SAMPLES		BDL	BDL				
CYANAZINE (BLADEX) (NG/L)	)		DET'N LIMIT = 100.0		GUIDELINE = 10000 (A2)		
1991 FEB	BDL	BDL					
1991 JUN	989.000 <T	221.000 <T					
1991 AUG	!AW	!AW					
1991 OCT	!AW	!AW					
1991 NOV	!QU	!QU					
1992 FEB	BDL	BDL					
1992 APR	BDL	BDL					
1992 JUN	270.000 <T	BDL					
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL					
DESETHYL ATRAZINE (NG/L)	)		DET'N LIMIT = 200.0		GUIDELINE = 60000 (A2)		
1991 FEB	350.000 <T	BDL					
1991 JUN	390.000 <T	BDL					
1991 AUG	!AW	!AW					
1991 OCT	!AW	!AW					
1991 NOV	!QU	!QU					
1992 FEB	212.000 <T	BDL					
1992 APR	300.000 <T	BDL					
1992 JUN	BDL	BDL					
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
PESTICIDES AND PCB							
DESETHYL SIMAZINE (NG/L)			DET'N LIMIT = 200.0		GUIDELINE = 10000 (A2)		
16 SAMPLES	BDL	BDL					
PROMETONE (NG/L)			DET'N LIMIT = 50.000		GUIDELINE = 52500 (D3)		
14 SAMPLES	BDL	BDL					
PROPAZINE (NG/L)			DET'N LIMIT = 50.000		GUIDELINE = 700000 (D3)		
14 SAMPLES	BDL	BDL					
PROMETRYNE (NG/L)			DET'N LIMIT = 50.000		GUIDELINE = 1000 (A2)		
16 SAMPLES	BDL	BDL					
METRIBUZIN (SENCOR) (NG/L)			DET'N LIMIT = 100.0		GUIDELINE = 80000 (A1)		
1991 FEB	BDL	BDL					
1991 JUN	150.000 <T	BDL					
1991 AUG	IAW	IAW					
1991 OCT	IAW	IAW					
1991 NOV	IQU	IQU					
1992 FEB	BDL	BDL					
1992 APR	BDL	BDL					
1992 JUN	180.000 <T	BDL					
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL					
SIMAZINE (NG/L)			DET'N LIMIT = 50.00		GUIDELINE = 10000 (A2)		
1991 FEB	BDL	BDL					
1991 JUN	BDL	BDL					
1991 AUG	IAW	IAW					
1991 OCT	IAW	IAW					
1991 NOV	IQU	IQU					
1992 FEB	230.000 <T	BDL					
1992 APR	120.000 <T	50.000 <T					
1992 JUN	BDL	BDL					
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL					
ALACHLOR (LASSO) (NG/L)			DET'N LIMIT = 500.0		GUIDELINE = 5000 (A2)		
14 SAMPLES	BDL	BDL					

TABLE 4
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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
PESTICIDES AND PCB							
METOLACHLOR (NG/L)			DET'N LIMIT = 500.0		GUIDELINE = 50000 (A2)		
1991 FEB	BDL	BDL					
1991 JUN	2030.000 <T	BDL					
1991 AUG	!AW	!AW					
1991 OCT	!AW	!AW					
1991 NOV	BDL	BDL					
1992 FEB	BDL	BDL					
1992 APR	BDL	BDL					
1992 JUN	790.000 <T	BDL					
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL					
HEXAICYCLOPENTADIEN (NG/L)							
			DET'N LIMIT = 5.00		GUIDELINE = 206000 (D4)		
1991 FEB	BDL	8.000 <T			5.000 <T		
1991 JUN	!QU	!QU	!QU				
1991 AUG	!AW	!AW	!AW				
1991 OCT	BDL	153.000	139.000				
1991 NOV	BDL	52.000	18.000 <T				
1992 FEB	BDL						
1992 APR	!QU	!QU				!QU	
1992 JUN	!NR	!QU			!QU		
1992 AUG	!QU	!QU					
1992 DEC	!QU	!QU			!QU		

TABLE 4
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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
PHENOLICS							
PHENOLICS (UG/L)	)		DET'N LIMIT = 0.2	GUIDELINE = N/A			
1991 FEB	.400 <T	BDL					
1991 JUN	.800 <T	.400 <T					
1991 AUG	.200 <T	.200 <T					
1991 OCT	.400 <T	BDL					
1991 NOV	1.000 <T	.800 <T					
1992 FEB	1.400	BDL					
1992 APR	.600 <T	.800 <T					
1992 JUN	BDL	BDL					
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
POLYAROMATIC HYDROCARBONS							
PHENANTHRENE (NG/L)			DET'N LIMIT = 10.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
ANTHRACENE (NG/L)			DET'N LIMIT = 1.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
FLUORANTHENE (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = 42000 (D4)		
8 SAMPLES	BDL	BDL	BDL		BDL		
PYRENE (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
BENZO(A)ANTHRACENE (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
CHRYSENE (NG/L)			DET'N LIMIT = 50.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
DIMETH. BENZ(A)ANTHR (NG/L)			DET'N LIMIT = 5.0		GUIDELINE = N/A		
5 SAMPLES	BDL	BDL	BDL		!QU		
BENZO(E) PYRENE (NG/L)			DET'N LIMIT = 50.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
BENZO(B) FLUORANTHEN (NG/L)			DET'N LIMIT = 10.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
PERYLENE (NG/L)			DET'N LIMIT = 10.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
BENZO(K) FLUORANTHEN (NG/L)			DET'N LIMIT = 1.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
BENZO(A) PYRENE (NG/L)			DET'N LIMIT = 5.0		GUIDELINE = 10 (A1)		
8 SAMPLES	BDL	BDL	BDL		BDL		

TABLE 4
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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
POLYAROMATIC HYDROCARBONS							
BENZO(G,H,I) PERYLEN (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
DIBENZO(A,H) ANTHRAC (NG/L)			DET'N LIMIT = 10.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
INDENO(1,2,3-C,D) PY (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
BENZO(B) CHRYSENE (NG/L)			DET'N LIMIT = 2.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		
CORONENE (NG/L)			DET'N LIMIT = 10.0		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL	BDL		BDL		

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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
SPECIFIC PESTICIDES							
TOXAPHENE (NG/L)				DET'N LIMIT = 500.0	GUIDELINE = 5000 (A1)		
3 SAMPLES	BDL	BDL			BDL		
2,4,5-T (NG/L)				DET'N LIMIT = 50.0	GUIDELINE = 280000 (A1)		
8 SAMPLES	BDL	BDL					
2,4-D (NG/L)				DET'N LIMIT = 100.0	GUIDELINE = 100000 (A1)		
1991 JUN	530.000 <T	BDL					
1991 AUG	BDL	BDL					
1991 NOV	BDL	BDL					
1992 JUN	210.000 <T	BDL					
2,4-DB (NG/L)				DET'N LIMIT = 200.0	GUIDELINE = N/A		
8 SAMPLES	BDL	BDL					
2,4-D PROPIONIC ACID (NG/L)				DET'N LIMIT = 100.0	GUIDELINE = N/A		
1991 JUN	BDL	BDL					
1991 AUG	BDL	BDL					
1991 NOV	BDL	BDL					
1992 JUN	140.000 <T	BDL					
DICAMBA (NG/L)				DET'N LIMIT = 50.0	GUIDELINE = 120000 (A1)		
1991 JUN	1800.000	120.000 <T					
1991 AUG	BDL	BDL					
1991 NOV	BDL	60.000 <T					
1992 JUN	1020.000	530.000					
2,4,5-TP (SILVEX) (NG/L)				DET'N LIMIT = 20.00	GUIDELINE = 10000 (A1)		
8 SAMPLES	BDL	BDL					
DIAZINON (NG/L)				DET'N LIMIT = 20.0	GUIDELINE = 20000 (A1)		
4 SAMPLES	BDL	BDL					
DICHLOROVOS (NG/L)				DET'N LIMIT = 20.0	GUIDELINE = N/A		
4 SAMPLES	BDL	BDL					
CHLORPYRIFOS (NG/L)				DET'N LIMIT = 20.0	GUIDELINE = N/A		
4 SAMPLES	BDL	BDL					

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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
SPECIFIC PESTICIDES							
ETHION (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = 35000 (G)		
4 SAMPLES	BDL	BDL					
MALATHION (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = 190000 (A1)		
4 SAMPLES	BDL	BDL					
MEVINPHOS (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = N/A		
4 SAMPLES	BDL	BDL					
METHYL PARATHION (NG/L)			DET'N LIMIT = 50.0		GUIDELINE = 9000 (D3)		
4 SAMPLES	BDL	BDL					
METHYLTRITHION (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = N/A		
4 SAMPLES	BDL	BDL					
PARATHION (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = 50000 (A1)		
4 SAMPLES	BDL	BDL					
PHORATE (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = 2000 (A2)		
4 SAMPLES	BDL	BDL					
RELDAN (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = N/A		
4 SAMPLES	BDL	BDL					
RONNEL (NG/L)			DET'N LIMIT = 20.0		GUIDELINE = N/A		
4 SAMPLES	BDL	BDL					
CARBOFURAN (NG/L)			DET'N LIMIT = 2000.0		GUIDELINE = 90000 (A1)		
6 SAMPLES	BDL	BDL					
CHLORPROPHAM (CIPC) (NG/L)			DET'N LIMIT = 2000.0		GUIDELINE = 350000 (G)		
6 SAMPLES	BDL	BDL					
DIALLATE (NG/L)			DET'N LIMIT = 2000.0		GUIDELINE = N/A		
6 SAMPLES	BDL	BDL					

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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT STANDING	DIST. SYSTEM WPCP PLANT STANDING
SPECIFIC PESTICIDES							
EPTAM (NG/L)				DET'N LIMIT = 2000.0	GUIDELINE = N/A		
6 SAMPLES	BDL	BDL					
IPC (NG/L)				DET'N LIMIT = 2000.0	GUIDELINE = N/A		
6 SAMPLES	BDL	BDL					
PROPOXUR (NG/L)				DET'N LIMIT = 2000.0	GUIDELINE = 140000 (D3)		
6 SAMPLES	BDL	BDL					
CARBARYL (NG/L)				DET'N LIMIT = 200.0	GUIDELINE = 90000 (A1)		
6 SAMPLES	BDL	BDL					
BUTYLATE (NG/L)				DET'N LIMIT = 2000.0	GUIDELINE = 245000 (D3)		
6 SAMPLES	BDL	BDL					

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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
VOLATILES							
BENZENE (UG/L)	)		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)		
29 SAMPLES	BDL	BDL	BDL		BDL		BDL
TOLUENE (UG/L)							
	)		DET'N LIMIT = 0.05		GUIDELINE = 24 (A3)		
1991 FEB	BDL	BDL			BDL		
1991 JUN	BDL	BDL	BDL				
1991 AUG	BDL	BDL	BDL				
1991 OCT	BDL	.050 <T	.100 <T				
1991 NOV	BDL	BDL	BDL				
1992 FEB	BDL	BDL	.050 <T				
1992 APR	BDL	BDL				BDL	
1992 JUN	BDL	BDL			BDL		
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL			BDL		
ETHYLBENZENE (UG/L)							
	)		DET'N LIMIT = 0.05		GUIDELINE = 2.4 (A3)		
1991 FEB	.050 <T	.050 <T			.050 <T		
1991 JUN	BDL	.100 <T	BDL				
1991 AUG	BDL	.100 <T	BDL				
1991 OCT	BDL	.050 <T	BDL				
1991 NOV	.050 <T	.100 <T	.100 <T				
1992 FEB	.050 <T	BDL	.050 <T				
1992 APR	BDL	.050 <T				.200 <T	
1992 JUN	BDL	.050 <T			.100 <T		
1992 AUG	BDL	BDL					
1992 DEC	.100 <T	.100 <T			.100 <T		
P-XYLENE (UG/L)							
	)		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)		
29 SAMPLES	BDL	BDL	BDL		BDL		BDL
M-XYLENE (UG/L)							
	)		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)		
29 SAMPLES	BDL	BDL	BDL		BDL		BDL
O-XYLENE (UG/L)							
)		DET'N LIMIT = 0.05		GUIDELINE = 300 (A3*)		
29 SAMPLES	BDL	BDL	BDL		BDL		BDL

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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
VOLATILES							
STYRENE (UG/L)	)		DET'N LIMIT = 0.05		GUIDELINE = 100 (D1)		
1991 FEB	.100 <T	.100 <T	.	.150 <T	.	.	.
1991 JUN	BDL	BDL	BDL	.	.	.	.
1991 AUG	BDL	.150 <T	.050 <T	.	.	.	.
1991 OCT	BDL	BDL	BDL	.	.	.	.
1991 NOV	.150 <T	.100 <T	.200 <T	.	.	.	.
1992 FEB	.100 <T	BDL	.150 <T	.	.	.	.
1992 APR	BDL	BDL	.	.	.	.300 <T	.
1992 JUN	BDL	BDL	.	.150 <T	.	.	.
1992 AUG	BDL	BDL	.	.	.	.	.
1992 DEC	.150 <T	.100 <T	.	.200 <T	.	.	.
1,1-DICHLOROETHYLENE (UG/L)							
29 SAMPLES	BDL	BDL	BDL	.	BDL	.	BDL
METHYLENE CHLORIDE (UG/L)	)		DET'N LIMIT = 0.50		GUIDELINE = 50 (A1)		
29 SAMPLES	BDL	BDL	BDL	.	BDL	.	BDL
T12-DICHLOROETHYLENE (UG/L)							
29 SAMPLES	BDL	BDL	BDL	.	BDL	.	BDL
1,1-DICHLOROETHANE (UG/L)							
29 SAMPLES	BDL	BDL	BDL	.	BDL	.	BDL
CHLOROFORM (UG/L)							
	)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)		
1991 FEB	BDL	22.500	.	28.100	.	.	.
1991 JUN	BDL	50.000	50.000	.	.	.	.
1991 AUG	BDL	67.700	46.800	.	.	.	.
1991 OCT	BDL	79.600	65.900	.	.	.	.
1991 NOV	BDL	36.400	33.400	.	.	.	.
1992 FEB	BDL	27.200	31.800	.	.	.	.
1992 APR	BDL	81.200	.	.	.	55.900	.
1992 JUN	BDL	41.700	.	54.900	.	.	.
1992 AUG	BDL	79.900	.	.	.	.	.
1992 DEC	BDL	41.500	.	30.500	.	.	.
111,TRICHLOROETHANE (UG/L)							
29 SAMPLES	BDL	BDL	BDL	.	BDL	.	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
VOLATILES							
1,2 DICHLOROETHANE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)		
29 SAMPLES	BDL	BDL	BDL		BDL		BDL
CARBON TETRACHLORIDE (UG/L)			DET'N LIMIT = 0.20		GUIDELINE = 5 (A1)		
29 SAMPLES	BDL	BDL	BDL		BDL		BDL
1,2-DICHLOROPROPANE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)		
29 SAMPLES	BDL	BDL	BDL		BDL		BDL
TRICHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 50 (A1)		
29 SAMPLES	BDL	BDL	BDL		BDL		BDL
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)		
1991 FEB	BDL	6.750			6.800		
1991 JUN	BDL	15.600	16.800				
1991 AUG	BDL	17.250	16.650				
1991 OCT	BDL	19.000	16.600				
1991 NOV	BDL	15.200	13.400				
1992 FEB	BDL	6.650	11.950				
1992 APR	BDL	13.100					
1992 JUN	BDL	18.450			20.000		9.500
1992 AUG	BDL	19.700					
1992 DEC	BDL	15.200			10.300		
112-TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 0.6 (D4)		
29 SAMPLES	BDL	BDL	BDL		BDL		BDL
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)		
1991 FEB	BDL	1.300			1.000		
1991 JUN	BDL	4.000	4.000				
1991 AUG	BDL	4.000	5.400				
1991 OCT	BDL	3.500	3.400				
1991 NOV	BDL	5.500	4.400				
1992 FEB	BDL	.700 <T	3.000				
1992 APR	BDL	1.200					1.100
1992 JUN	BDL	5.300			5.400		
1992 AUG	BDL	3.700					
1992 DEC	BDL	3.100			2.400		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
VOLATILES							
TETRACHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 65 (A5)			
29 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
BROMOFORM (UG/L)							
			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)			
1991 FEB	BDL	BDL		BDL			
1991 JUN	BDL	BDL	BDL				
1991 AUG	BDL	BDL	400 <T				
1991 OCT	BDL	BDL	BDL				
1991 NOV	BDL	400 <T	BDL				
1992 FEB	BDL	BDL	BDL				
1992 APR	BDL	BDL				BDL	
1992 JUN	BDL	BDL		BDL			
1992 AUG	BDL	BDL					
1992 DEC	BDL	BDL		BDL			
1122-TETCHLOROETHANE (UG/L)							
			DET'N LIMIT = 0.05	GUIDELINE = 0.17 (D4)			
29 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VINYL CHLORIDE (UG/L)							
			DET'N LIMIT = 0.100	GUIDELINE = 2 (D1)			
14 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
C12-DICHLOROETHYLENE (UG/L)							
			DET'N LIMIT = 0.100	GUIDELINE = 70 (D1)			
14 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
CHLOROBENZENE (UG/L)							
			DET'N LIMIT = 0.10	GUIDELINE = 1510 (D3)			
29 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-DICHLOROBENZENE (UG/L)							
			DET'N LIMIT = 0.10	GUIDELINE = 5 (A1)			
29 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,3-DICHLOROBENZENE (UG/L)							
			DET'N LIMIT = 0.10	GUIDELINE = 3750 (D3)			
29 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-DICHLOROBENZENE (UG/L)							
			DET'N LIMIT = 0.05	GUIDELINE = 200 (A1)			
29 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ETHYLENE DIBROMIDE (UG/L)							
			DET'N LIMIT = 0.05	GUIDELINE = 50 (D1)			
29 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
VOLATILES							
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)		
1991 FEB	BDL	30.650			35.950		
1991 JUN	BDL	69.600	70.800				
1991 AUG	BDL	88.950	69.250				
1991 OCT	BDL	102.100	85.900				
1991 NOV	BDL	57.400	51.200				
1992 FEB	BDL	34.500	46.800				
1992 APR	BDL	95.500				66.500	
1992 JUN	BDL	65.450		80.300			
1992 AUG	BDL	103.300					
1992 DEC	BDL	59.800		43.200			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ALVINSTON WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM RAILROAD ST FREE FLOW	DIST. SYSTEM RAILROAD ST STANDING	DIST. SYSTEM LISGAR ST FREE FLOW	DIST. SYSTEM LISGAR ST STANDING	DIST. SYSTEM WPCP PLANT FREE FLOW	DIST. SYSTEM WPCP PLANT STANDING
RADIONUCLIDES							
COBALT 60 (Bq/L)			DET'N LIMIT = 0.70		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL					
CESIUM 134 (Bq/L)							
			DET'N LIMIT = 0.70		GUIDELINE = N/A		
8 SAMPLES	BDL	BDL					
CESIUM 137 (Bq/L)							
			DET'N LIMIT = 0.70		GUIDELINE = 50 (A1)		
8 SAMPLES	BDL	BDL					
GROSS ALPHA COUNT (Bq/L)							
			DET'N LIMIT = 0.04		GUIDELINE = 0.55 (D1)		
1991 FEB	.130	.040					
1991 AUG	.140	.080					
1991 OCT	.170	.080					
1992 JUN	.130	.070					
GROSS BETA COUNT (Bq/L)							
			DET'N LIMIT = 0.04		GUIDELINE = N/A		
1991 FEB	.100	BDL					
1991 AUG	.160	.100					
1991 OCT	.120	.080					
1992 JUN	.170	.090					
TRITIUM (Bq/L)							
			DET'N LIMIT = 7.00		GUIDELINE = 40000 (A1)		
8 SAMPLES	BDL	BDL					
IODINE 131 (Bq/L)							
			DET'N LIMIT = 0.70		GUIDELINE = 10 (A1)		
8 SAMPLES	BDL	BDL					

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A4)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.20	30-500 (A4)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.20	100.0 (F2)
CHLORIDE	MG/L	0.20	250.0 (A3)
COLOUR	TCU	0.50	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.00	400.0 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.10	5.0 (A3)
FLUORIDE	MG/L	0.01	1.5* (A1)
HARDNESS	MG/L	0.50	80-100 (A4)
IONCAL	DMNSLESS	N/A	N/A
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.10	30.0 (F2)
NITRATES (TOTAL)	MG/L	0.005	10.0 (A1)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
POTASSIUM	MG/L	0.010	10.0 (F2)
RESIDUE FILTRATE (CALCULATED TDS)	MG/L	N/A	500.0 (A3)
SODIUM	MG/L	0.20	200.0 (A4)
SULPHATE	MG/L	0.20	500.0 (A4)
TURBIDITY	FTU	0.05	1.0 (A1)
* The Maximum Acceptable Concentration (MAC) for <u>naturally occurring fluoride</u> in drinking water is 2.4 mg/L.			
CHLOROAROMATICS			
1,2,3-TRICHLOROBENZENE	NG/L	5.0	N/A
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,4-TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.0	N/A
2,3,6-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,6A-TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE (HCB)	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
2,3,4-TRICHLOROPHENOL	NG/L	100.0	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	20.0	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
2,4,5-TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	N/A
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
POLYNUCLEAR AROMATIC HYDROCARBONS			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DESETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	30000 (A1)
O,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDE	NG/L	1.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
DESETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	N/A
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.0	N/A
2,4,5-TRICHLOROPHOXY ACETIC ACID	NG/L	50.0	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.0	100000 (A1)
2,4-DICHLOROPHOXYBUTYRIC ACID (2,4-DB)	NG/L	200.0	N/A
2,4,5-TP (SILVEX)	NG/L	20.0	10000 (A1)
BUTYLATE (SUTAN)	NG/L	2000.0	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.0	90000 (A1)
CARBOFURAN	NG/L	2000.0	90000 (A1)
CHLORPROPHAM (CIPC)	NG/L	2000.0	350000 (G)
CHLORPYRIFOS (DURSBAN)	NG/L	20.0	N/A
DIALLATE	NG/L	2000.0	N/A
DIAZINON	NG/L	20.0	20000 (A1)
DICAMBA	NG/L	50.0	120000 (A1)
DICHLOROVOS	NG/L	20.0	N/A
EPTAM	NG/L	2000.0	N/A
ETHION	NG/L	20.0	35000 (G)
IPC	NG/L	2000.0	N/A
MALATHION	NG/L	20.0	190000 (A1)
METHYL PARATHION	NG/L	50.0	9000 (D3)
METHYLTRITHION	NG/L	20.0	N/A
MEVINPHOS	NG/L	20.0	N/A
PARATHION	NG/L	20.0	50000 (A1)
PHORATE (THIMET)	NG/L	20.0	2000 (A2)
PICHLORAM	NG/L	100.0	190000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.0	140000 (D3)
RELDAN	NG/L	20.0	N/A
RONNEL	NG/L	20.0	N/A
VOLATILES			
1,1-DICHLOROETHANE	UG/L	0.10	N/A
1,1-DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2-DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2-DICHLOROETHANE	UG/L	0.05	5 (A1)
1,2-DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3-DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4-DICHLOROBENZENE	UG/L	0.10	5 (A1)
1,1,1-TRICHLOROETHANE	UG/L	0.02	200 (D1)
1,1,2-TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1,1,2,2-TETRACHLOROETHANE	UG/L	0.05	0.17 (D4)

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
CIS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	65 (A5)
TRANS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)
VINYL CHLORIDE	UG/L	0.10	2 (D1)

RADIONUCLIDES

TRITIUM	BQ/L	7.0	40000 (A1)
GROSS ALPHA COUNT	BQ/L	0.04	0.55# (D1)
GROSS BETA COUNT	BQ/L	0.04	N/A
COBALT 60	BQ/L	0.70	N/A
CESIUM 134	BQ/L	0.70	N/A
CESIUM 137	BQ/L	0.70	50 (A1)
IODINE 131	BQ/L	0.70	10 (A1)

Equal to 15.0 Picocuries/litre

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1992, 109 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment and Energy (MOEE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOEE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOEE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOEE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOEE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOEE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOEE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

PARAMETER REFERENCE INFORMATION

NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C₆H₆

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNOMYS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27)
CYCLOHEXATRIENE (41)

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NONPOLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30)

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25°C (41)
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80)

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES: MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27)
BOILING POINT: 80.1°C (27)
SPECIFIC GRAVITY: 0.8790 AT 20°C (27)
VAPOUR PRESSURE: 100 MM AT 26.1°C (27)
HENRY'S LAW CONSTANT: 0.00555 ATM-M³/MOLE (41)
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39)
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO ₃) (Caution: HNO ₃ is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Specific Pesticides (OWCP), (PEOP), (PECAR)	-as per Organics -three extra bottles must be filled
Polyaromatic hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate
Cyanide (Treated only)	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO ₃) and potassium dichromate (K ₂ Cr ₂ O ₇) (Caution: HNO ₃ &K ₂ Cr ₂ O ₇ are corrosive)

Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year) (PBVOL), (PBEXT)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.
6. No smoking in area of sample location.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO ₃) (Caution: HNO ₃ is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.

5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO ₃ (Caution: HNO ₃ is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Polyaromatic Hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.



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